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Assessing Technology Leaks

By PHILIP M. BOFFEY

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WASHINGTON, Jan. 1 — Two years ago, a group of Boy Scouts walking along the beach in the State of Washington spotted a red-and-white sphere bobbing in the water. On its sides, written in Russian and English, was the phrase "USSR Academy of Sciences," suggesting that it was an innocuous research buoy.

But when military investigators examined the sphere's innards, they concluded that it had a more sinister purpose. It was actually a military sonobuoy that had been dropped offshore, the investigators say, to eavesdrop on Trident missile submarines based in nearby Bremerton.

Moreover, the acoustic buoy appeared to have been copied from American designs and electronic components. It even contained an extraneous screw, threaded the wrong way, that served no purpose whatever but was identical to the extraneous screws an American designer had used as a "signature."

The incident provides a striking example, military officials say, of how the Russians, using theft and open scientific exchanges, are acquiring American technological advances for military purposes.

Second of two articles on the control of strategic exports.

Such "technology transfers" or "technology leaks," as they are sometimes called, have brought about an intensifying debate in Washington and abroad over the magnitude of the threat and what should be done about it.

The Reagan Administration has asserted that a substantial amount of militarily important American technology has been illegally exported to the Soviet Union. But some civilian analysts are openly skeptical that the problem is as serious as officially portrayed.

"The scale of such militarily related transfers and their significance to the strengthening of the Soviet military potential have been widely overstated," writes Julian Cooper of the Center of Russian and East European Studies in Britain in a chapter of a book that will be published soon under the sponsorship of the Center for Strategic and International Studies at Georgetown University.

The array of technology losses cited by the military agencies is notable for its lack of items that are of major strategic importance. There appear to be no technology transfers that have revolutionized the world military balance.

"You're not going to find the shattering case that lights up the sky," said Stephen D. Bryen, Deputy Assistant Secretary of Defense, one of the Pentagon's most fervent crusaders for stronger controls on technology transfers. "You're going to find a much more gradual process" in which the Russians gain better tools and devices to make better weapons, he added.

The true extent of the leakage and its importance to the military balance are largely hidden behind the shroud of classification.

Sharper Focus on Issue

The military and intelligence agencies have issued periodic unclassified reports describing the problem, generally written so tersely or vaguely that it is impossible to divine the true military consequences of particular transfers. But as the debate has intensified over the past couple of years, civilian analysts, both in the Government and out, have begun to bring the nature of the problem into sharper focus. The main lessons emerging are these:

¶No technology yet lost to the Soviet Union has caused a decisive shift in the military balance. There is nothing even remotely like the betrayal of the atomic bomb secrets to the Soviet Union in the 1940's.

¶What the Russians gain in pirating or purchasing Western technology is precious time and money that would otherwise have to be spent on original development work. The Soviet Union could eventually develop virtually everything it obtains from the West, given enough incentive to pour in the resources.

¶The losses amount to hundreds of moderately important technologies that, cumulatively, help the Soviet Union in the race to catch up with the greater technical sophistication of American military forces.

¶The Russian have sometimes been unable to absorb and use the Western technologies they have obtained; at other times, they have used them promptly and rapidly improved upon them.

¶There is a small reverse flow of technology transfers from East to West, which is seldom discussed, in which Soviet bloc technologies are used to enhance American military weaponry.

The size of the American technology loss is almost impossible for outsiders to measure. Intelligence officials have talked of a "hemorrhage" of technologies, and the 1984 edition of "Soviet Military Power," published by the Defense Department, refers to "an analysis of nearly 800 cases involving Soviet acquisitions of Western technology." But the analysis is classified, and military officials have released information on only a few score of cases, many of which are ambiguous.

The only major strategic loss cited appears, on close inspection, to be overstated. In the 1970's, military intelligence officials contended that the United States had sold the Russians a technical capability that allowed them to produce a new generation of intercontinental ballistic missiles.

The Commerce Department approved the sale of some 168 precision grinding machines to the Soviet Union and these were able, the officials said, to make the tiny, exquisitely precise ball bearings that are used in the gyroscopes that guide long-range missiles to their targets.

As a result, the military analysts contended, the Russians were able to produce, for the first time, missiles similiar to MIRV's, or multiple independently targetable re-entry vehicles, which can fire warheads at several different targets. That in turn, some analysts say, made the American Minuteman missiles obsolete and pushed this nation toward developing the MX missile in response.

But several analysts have challenged this interpretation of events. Some contend that the Russians obtained the grinders too late in the development process for them to have played a crucial role in the development of MIRV's. Others say that American machines were not needed to do the job. And at least two Government reports acknowledged that the equipment was avaliable from several foreign countries, including Switzerland.

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Analysts on both sides of the debate agree that there is little likelihood of a technology loss that would immediately upend the current military balance. In a 1981 report to the Defense Advanced Research Projects Agency, Thane Gustafson, then an analyst at the Rand Corporation of Santa Monica, Calif., concluded that "the chances of a sudden doomsday giveaway through trade are next to nil."

He noted that the United States depends on a range of different weapons systems so that no single new weapon is crucial. "The fear that the United States is unwittingly selling the rope that the Russians will shortly use to hang us is hardly credible," Mr. Gustafson concluded.

What troubles Defense Department advocates of stronger export controls, however, is the steady drip of technology transfers that may gradually erode the qualitative technological superiority that the West has traditionally relied upon to offset the quantitative superiority of the Soviet Union in military equipment and manpower.

In a recent interview, Mr. Bryen of the Pentagon said the loss that he found most disturbing involved the manufacturing technologies for certain electronic chips and semiconductors, which French and American companies sold to Poland during the 1970's, the era of détente.

He said the French sold the Poles a factory to make the kind of transistor-transistor logic chips that remain the most heavily used chips in American weapons systems. Although these are not the most advanced chips available, he said, they are fast and reliable and help the Soviet bloc produce better weapons.

How important such transfers are to the Soviet military effort is a matter of debate, but most analysts believe there is little that the Soviet Union cannot do on its own if it has a mind to. "The Soviet Union is a very sophisticated country and they can do pretty much anything they want to," says Loren Graham, an expert on Soviet science at the Massachusetts Institute of Technology.

"They may not be a leader in technology, but they're pretty good followers," Mr. Graham went on. "Anything we get, they're going to get in a few years, and I don't think whether they steal the technology is going to change that picture very much."

One of the few areas where the Russians appear to be having difficulty matching the West, despite increasingly vigorous efforts to do so, is the field of computer hardware and software. The leading American expert on Soviet computers — Seymour E. Goodman of the University of Arizona — finds that the Soviet Union has made considerable progress over the last 15 years by intensively pursuing Western technology.

Even so, he says, the Russians have had difficulty assimilating the technology. Professor Goodman, in a chapter of the book being prepared by the Center for Strategic and International Studies, writes, "Each year the Soviets obtain many thousands of Western research papers, new product announcements, products, descriptions of new applications, etc."

"What the Soviets are seeing," he continues, "are very broad and rapid rates of incremental innovation, and they are not fully capable of understanding or coping with it."

Alternatives Believed Used

Technology is not the only element of a weapons system, however, and some scholars believe that the Russians are expert at designing around their technical deficiencies.

Robert Campbell, professor of economics at Indiana University and president of the American Association for the Advancement of Slavic Studies, said: "Very often there are second-best ways of doing things, and the Soviets are artists at that. They sent the first satellite into space with a lot worse technology than we had."

Other scholars note that for many years the Soviet Union compensated for relative lack of accuracy in its missiles by putting them on enormous rockets that could carry very large warheads that did not need to hit their targets with total precision.

Quantifying Problem Difficult

Efforts to quantify the total value of the technologies transferred to the Soviet Union have proved frustratingly contradictory. B-K Dynamics Inc., an engineering consulting concern in Rockville, Md., recently surveyed a dozen studies that attempted to analyze the value to the Soviet Union of acquiring Western technologies. The answers, according to Bradford Smith, a vice president of B-K, varied considerably.

Some studies dealing with technology transfers as a whole concluded that it actually cost the Soviet Union more to absorb and modify imported technologies than it would have if the Russians developed the technologies on their own. Others concluded that the Russians got up to 14 times as much value from imported technologies as from their own.

The Pentagon has hired Mr. Smith's company to measure the value of stopping current and future technology transfers. It is intended, military officials acknowledge, to provide evidence that the costly and cumbersome export control system is well worth retaining.

In a briefing on material that will be released soon, Mr. Smith said that he had reviewed 79 key technologies of military importance for which export licenses were requested in 1983 and 1984, all destined for Warsaw Pact countries.

If these licenses had been approved, Mr. Smith said, the Soviet Union would have saved some $6.6 billion to $13 billion in development costs over the next 12 years, and the United States would have been forced to spend even more to counter the new Soviet threats.

Richard N. Perle, Assistant Secretary of Defense, goes even further, asserting that the United States has already been forced to spend "tens of billions of dollars" to overcome past Soviet acquisitions of Western technology.

Such dollar figures take no account of the operational military significance of any acquisitions, a matter on which there is wide debate.

The Soviet sonobuoy that was found by the Boy Scouts alarmed some military officials because it could distinguish the sound of one Trident submarine from another, enabling the Russians to know precisely which submarines were at sea. But it was not, most experts believe, a technology that threatened the survival of the American undersea missile deterrent.

The Russians had long been listening to American submarines with less advanced sonobuoys, and military officials assert that America's own sonobuoys remain superior to this latest Russian copy. If there is a sonobuoy gap, they say, it still favors the Americans.

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